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COMMONWEALTH OF PENNSYLVANIA  
Environmental Resources  
March 21, 1991  
8-341-6000

SUBJECT: Aquatic Biology Investigation  
Laurel Run, Berks County  
Tributary to Schuylkill River  
Stream Code: 1.15.5 (01981)

RECEIVED JUN 11 1991

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#### Introduction

On October 15 and 25, 1990, Water Pollution Biologist Steve Schubert and the writer conducted a stream survey on Laurel Run, a tributary to the Schuylkill River in Alsace and Muhlenberg Townships, Berks County. The purpose of the survey was to assess any continuing impacts from the NGK Metals plant following NGK's treatment process upgrade and preceding their pending permit renewal.

Laurel Run originates just west of Breezy Corner and south of PA route 73. It flows westward for 11.3 kilometers (7.0 miles) to its mouth on the Schuylkill River at Muhlenberg Park. Gradient in the headwaters is fairly steep but decreases as the stream flows through the borough of Temple. Overall gradient is 16.1 meters/kilometer (85.7 feet/mile). The upstream half of the stream flows through wooded terrain with scattered private homes. Suburban and urban land usage dominates the downstream reaches of Laurel Run.

Several past investigations of Laurel Run have documented severe impacts from mushroom farming and associated pesticide use, industrial waste discharges, and a quarry dewatering effluent. Frey (1971) found degraded conditions in the stream below the lower bridge on Laurel Mountain Road in Temple, and the absence of any aquatic life downstream from PA route 61. Bronner (1982) noted poor water quality and a paucity of aquatic life from Water Street in Temple downstream to route 61 with slight recovery evident in the reach of Laurel Run near its mouth. A Pennsylvania Fish Commission survey by Spotts (1989) revealed the complete absence of aquatic invertebrates and fish from the NGK Metals plant discharge site downstream to Berks Products Temple Quarry discharge stream. Baker (1989) surveyed Laurel Run at the request of the Pottsville District Mining Office in order to assess possible stream degradation caused by the Temple Quarry discharge. He found elevated metals concentrations and a virtually non-existent aquatic invertebrate community downstream from NGK, and sediment loading but a viable aquatic community below the Temple Quarry.

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### Materials and Methods

Five stations were selected for chemical and biological analyses. Field measurements of temperature, pH, dissolved oxygen, and specific conductivity were taken. Non-composite grab samples were collected in 500 milliliter plastic sample bottles for laboratory analysis. In addition to standard parameters, tests for total and dissolved metals were requested at each station. Because of the possible impact from runoff from mushroom growing and processing operations located near the headwaters of the stream, sewage parameters plus sulfate and chloride were requested at stations 1 and 2. A qualitative benthic invertebrate assessment was conducted at each station using a standard kick screen and rock picks. The fish community was evaluated at the upstream four stations using a Coffelt BP-II backpack electrofisher with hand-held probes and nets.

### Field Observations and Data Analyses

Station 1: Laurel Run at lower bridge on Fox Road (T-573) river mile 5.83 - The water was clear and the stream flow normal. The stream was narrow (1-3 meters) and flowed through mostly wooded terrain. It had a fairly steep gradient and a pool to riffle ratio of 1:1. Cobble and gravel were the major substrate types along with boulders and sand. Rocks and undercut banks provided cover. Shading was dense and bank erosion light.

Field and laboratory chemical analyses and invertebrate sampling indicated excellent water quality. The dominant benthic taxa were the sensitive stonefly Peltoperla and the mayflies Isonychia and Stenonema. Twenty-two taxa were identified.

A short electrofishing run resulted in the capture of two adult brown trout. It appeared that Laurel Run at this location contains the habitat and water quality to support salmonid reproduction.

Station 2: Laurel Run at the bridge on Hay Road in Temple Borough; river mile 2.57 - The water was clear and the stream flow normal. The stream flowed through a residential area with small scattered woodlots and open fields. The stream was approximately 3 to 5 meters wide with less gradient than at station 1. Substrate was mainly cobble with moderate amounts of boulders, gravel, and sand.

Larger rocks had a coating of filamentous algae. Pool to riffle ratio was about 1:2.

Field chemistries revealed an alkaline stream with high dissolved oxygen and no obvious water quality problems. The benthic community, however, was much reduced (13 taxa) from station 1, and was dominated by tolerant organisms such as Oligochaetes, Chironomids, and Gastropods. Although the chemical analyses revealed only slight increases in parameters associated with nutrient loading, the invertebrates collected are those usually found under conditions of increased enrichment.



Eight minutes of electrofishing yielded 4 species of stream forage fishes. Blacknose dace and creek chubs were dominant.

This station was selected because it was upstream from possible impacts from the Muhlenberg Swim Club unpermitted filter backwash discharge. Station 2 apparently has been degraded by runoff from the numerous mushroom farms and processing plants upstream. cursory observations revealed the presence of salmonids and sensitive invertebrate taxa downstream as far as the first bridge on Mount Laurel Road above the Ontelaunee Farms mushroom complex.

Station 3: Laurel Run just downstream from U.S. Route 222 bridge; river mile 2.30 - The water was clear and the flow normal. This station was adjacent to the Temple PennDot shed and downstream from the Muhlenberg Swim Club pool. The stream averaged about 4 meters in width and consisted mainly of a continuous shallow riffle. Cover, provided by rocks and small pools, was scarce. Substrate was mainly gravel with some sand and a few boulders and cobble. The station had only about 10% shading and exhibited moderate bank erosion. No periphyton or macrophytes were observed.

Field water chemistries were virtually unchanged from Station 2. Enrichment parameters included in the laboratory analyses decreased from station 2. No obvious water quality problems were noted.

The invertebrate sampling again revealed a severely depressed fauna consisting mainly of Oligochaetes, Chironomids, and Gastropods. Eight total taxa were collected. Snails were abundant.

Electrofishing for approximately 10 minutes captured the same four species that were present at Station 2. One individual white sucker and three longnose dace were captured. Blacknose dace and creek chubs were common.

Station 4: Laurel Run 30 meters downstream from NGK Metals discharge; river mile 2.19 - The water was clear and the flow was normal. This station was located adjacent to a small industrial complex. It was bordered by woodlots. Shading was approximately 80%, comprised of trees and shrubs. Bank erosion was moderate to heavy. Main substrate types were gravel and sand with sparse boulders and cobble. The pool to riffle ratio was 1:1. Large rocks provided most of the instream cover. No aquatic plants were observed.

Field chemical tests showed adequate dissolved oxygen and slightly alkaline conditions. The conductivity had increased approximately 10% from station 3.

Laboratory chemical analyses at station 4 showed substantial increases in BOD<sub>5</sub>, COD, nitrite nitrogen, nitrate nitrogen, ammonia nitrogen, Kjeldahl nitrogen, total hardness, and copper.

Invertebrate sampling indicated a depauperate benthic community with a total of 6 taxa present. Eighteen individuals of these 6 taxa represented about 95% of

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the total fauna found in 3 kick screens plus rock picks. Only tolerant forms such as snails, leeches, aquatic earthworms and limpets were collected. Electrofishing for 8 minutes over approximately 100 meters yielded 3 species of fish including one individual bluegill. Creek chubs were common and blacknose dace present.

Station 5: Laurel Run at the Muhlenberg Township Park along Reading Crest Road: river mile 1.38 - The water was clear and the flow was normal. Surrounding terrain was mostly residential with a small township park located adjacent to the stream. Trees and shrubs were sparse as most of the park area had been cleared to accommodate a grassy expanse. Shading was only about 20%. Bank erosion was moderate although a portion of the stream was enclosed with stone/concrete retaining walls. Stream width was about 3 meters. The pool to riffle ratio was 1:1. Substrate consisted of mostly cobble with gravel, sand, and scattered boulders. Rocks and undercut banks provided cover. Sparse periphyton was found throughout the station.

Field water chemistries showed again a 10% increase in specific conductivity from Station 4. Other parameters varied little from upstream measurements. The elevated parameters found at station 4 in the laboratory analyses all decreased to near station 3 levels. The pH (lab) and total alkalinity increased slightly.

The invertebrate community was again severely depressed with 4 taxa identified. Eleven total individuals including 8 chironomids were collected.

No electrofishing was conducted at Station 5. Several forage fish, probably blacknose dace, were observed. One longnose dace was captured in the kick screen.

### Conclusions

1. Laurel Run exhibits a healthy coldwater aquatic community in the headwaters and downstream at least as far as the middle bridge on Mount Laurel Road.
2. The stream is degraded at station 2 probably by point and non-point sources related to mushroom farming and processing.
3. Laurel Run is further degraded at station 3 probably by a combination of storm water runoff, the unpermitted filter backwash discharges from the Muhlenberg Swim Club, and possible runoff from the Temple PennDot shed.
4. Stations 4 and 5 are slightly more degraded than Station 3, but it appears that these stations have improved somewhat since surveys done on January 13, 1989, by the Pennsylvania Fish Commission (PFC) and on January 26, 1989, by the Bureau of Mining and Reclamation (BMR). During these two surveys, no invertebrate life was found in the stretch of stream from the NGK Metals discharge downstream to the confluence with a tributary





from Frush Valley that receives effluent water from the Berks Products Temple Quarry (river mile 0.94).

5. The increases in laboratory chemical parameters from station 3 to station 4, especially total hardness, total copper, and COD, can possibly be attributed to the NGK discharge because it is the only point source entering Laurel Run between the two stations. Stations 3 and 4 are approximately 175 meters (.11 mile) apart. The stretch between the two stations does receive surface runoff from the Temple PennDot shed and a mobile home park.

*Concn.  
of Cu  
in water  
at Station 4  
is 35  
66 ppb.  
Station 4 is  
30A downstream  
of NGK.*

#### Recommendations

1. Biomonitoring should be included as a condition of the NGK Metals permit. Because of numerous impacts to the stream, it is impossible to separate the effects of the NGK discharge from other sources of toxicity to the aquatic community. Any toxicity directly attributable to NGK can be detected through biomonitoring.
2. A follow-up survey should be conducted within three years to document any further improvements on Laurel Run. The Reading Field Office is taking action to correct the unpermitted discharge from the Muhlenberg Swim Club.

#### References

- Baker, H.S., Jr., and R.A. Hazenstab. 1989. Biological and chemical stream survey: Laurel Run, Berks county, PA DER Bureau Mining and Reclamation, Harrisburg, Pa.
- Bronner, P.E. 1982 Aquatic biology investigation: Laurel Run, Berks County, PA DER Bureau of Water Quality, Reading, Pa.
- Frey, R.F. 1971, Aquatic biology investigation: Laurel Run, Berks County, PA DER Bureau of Water Quality, Reading, Pa.
- Spotts, D.E. 1989, Stream investigation: Laurel Run, Berks County, PA Fish Commission Division of Environmental Services, Pleasant Gap, Pa.

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# AQUATIC BIOLOGY INVESTIGATION

TABLE 1. WATER CHEMISTRY DATA

NAME OF STREAM: Laurel Run

COUNTY: Berks

DATE: October 15, 1990

TEST	DESCRIPTION	CONC	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5
	TEMPERATURE fld	C	11.0000	11.8000	17.7000	17.5000	19.7000
	SPEC COND field	uMOS	140.0000	185.0000	185.0000	205.0000	225.0000
	DISS OXYGEN fld	mg/l	10.2000	10.7000	10.4000	9.1000	9.6000
00310	BOD 5-DAY	mg/l	0.8000	0.8000	0.8000	2.0000	1.2000
	pH field		7.6800	8.2200	8.8200	8.3100	8.4600
00403	pH lab		7.3000	7.8000	7.8000	7.5000	7.9000
00340	CHEM OXYGEN DEM	mg/l	<10.0000	10.0000	<10.0000	12.0000	11.0000
00410	TOT ALK, CaCO <sub>3</sub>	mg/l	46.0000	70.0000	72.0000	68.0000	72.0000
00515	DISSOLVED SOL	mg/l	168.0000	202.0000			
00530	SUSPENDED SOL	mg/l	< 2.0000	2.0000			
00545	SETTLEABLE SOL	ml/l	< 0.4000	0.2000	< 0.4000	< 0.4000	< 0.4000
00610A	TOT NH <sub>3</sub> -N	mg/l	< 0.0200	0.0500	< 0.0200	0.4000	0.0900
00615A	TOT NO <sub>2</sub> -N	mg/l	< 0.0040	0.0100	0.0040	0.1680	0.0820
00620A	TOT NO <sub>3</sub> -N	mg/l	3.1500	3.1400	0.9000	1.5000	1.4800
00625A	T KJELD NIT	mg/l	0.3000	0.4400	< 0.2000	0.8400	0.3400
00650A	PHOS, TOTAL	mg/l	0.0400	0.0600			
00680	TOT ORG CARBON	mg/l	3.0000	4.4000			
00900A	TOT HARD, CaCO <sub>3</sub>	mg/l	79.0000		81.0000	113.0000	106.0000
00940A	CHLORIDE	mg/l	11.0000	15.0000			
00945A	SO <sub>4</sub> TOTAL	mg/l	27.0000	35.0000			
01010X	BERYLLIUM, DISS	ug/l			<25.0000	<25.0000	<25.0000
01010A	BERYLLIUM, DISS	ug/l	1.0000	1.0000			
01010X	BERYLLIUM, TOT	ug/l			<25.0000	<25.0000	<25.0000
01012A	BERYLLIUM, TOT	ug/l	1.0000	1.0000			
01032	CHROMIUM, HEX	ug/l	<10.0000	<10.0000	<10.0000	<10.0000	<10.0000
01034Y	CHROMIUM, TOT	ug/l			< 4.0000	< 4.0000	< 4.0000
01040A	COPPER, DISS	ug/l	16.0000	12.0000			
01042A	COPPER, TOT	ug/l	15.0000	12.0000			
<del>01042X</del>	<del>COPPER, TOT</del>	<del>ug/l</del>			<del>&lt;50.0000</del>	<del>66.0000</del>	<del>&lt;50.0000</del>
01065A	NICKEL, DISS	ug/l	<25.0000	<25.0000			
01067A	NICKEL, TOT	ug/l	<25.0000	<25.0000			
01067X	NICKEL, TOT	ug/l			<50.0000	<50.0000	<50.0000
01075A	SILVER, DISS	ug/l	<10.0000	<10.0000			
01075X	SILVER, DISS	ug/l			<10.0000	<10.0000	<10.0000
01077A	SILVER, TOT	ug/l	<10.0000	<10.0000			
01077X	SILVER, TOT	ug/l			<10.0000	<10.0000	
01105X	ALUMINUM, TOT	ug/l					<150.0000
	TOTAL COLIFORM	col/100ml	1100.0000	1900.0000			
	FECAL COLIFORM	col/100ml	280.0000	1800.0000			
	TOT FECAL STREP	col/100ml	680.0000	1600.0000			

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